

Approved by:

/ /

Process Engineer

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Equipment Engineer

1 SCOPE

The purpose of this document is to detail the use of the Trion Apollo Asher. All users are expected to have read and understood this document. It is not a substitute for in-person training on the system and is not sufficient to qualify a user on the system. Failure to follow guidelines in this document may result in loss of privileges.

2 REFERENCE DOCUMENTS

- Material Safety Data Sheets for Oxygen and Nitrogen
- Trion Apollo Asher Operations Manual

3 DEFINITIONS

n/a

4 TOOLS AND MATERIALS

4.1 General Description

4.1.1 The Trion Apollo Asher is a fully automated single wafer processing tool that utilizes downstream plasma to remove photoresist. It consists of a single process chamber, a microwave plasma generator, mass flow controlled gas delivery system, roughing pump and pressure control system (throttle valves), an electronics control system and an automated robotic wafer handler. The Asher detects endpoint by monitoring the 430nm optical signal from the plasma. Wafers are processed between 200C and 300C.

4.1.2 **Wafer Cassettes** – The Apollo Asher uses the dedicated 6” black wafer cassettes.

4.1.3 **Carrier Wafers** – The Apollo Asher is only set up to handle 6” wafers. Four inch wafers as well as wafer pieces may be processed using carriers wafers.

5 SAFETY PRECAUTIONS

5.1 Personal Safety Hazards

- 5.1.1 **Compressed Gas Hazards** - The ashing process uses compressed Oxygen and Nitrogen. These gases are nontoxic but, oxygen will accelerate combustion. Read safety data sheets (SDS) and be familiar with hazards and safety controls to prevent an accident, before using the system.
- 5.1.2 **Electrical Hazards** - The Asher uses high voltage microwave energy, which can result in burns or electrical shocks. **NEVER** operate the tool with the covers off.
- 5.1.3 **Mechanical Hazards** - The Asher uses mechanical drives to actuate the door and wafer handling arm. These devices may move quickly and with great force. Do not insert objects (such as tweezers or fingers) into the ashер for any reason.

5.2 Hazards to the Tool

- 5.2.1 **Contamination** – This tool is used to process materials that represent a contamination hazard to other tools. To prevent cross contamination of other tools, wafers that have been through the Apollo Asher should not be processed in any of the wet benches or thermal processes.
- 5.2.2 **Loading** - Carefully load cassette and be careful that no wafers are cross-slotted.
- 5.2.3 **Wafer Size** – Only 6” wafers or wafer carriers may be processed on this tool.
- 5.2.4 **Wafer Material** – III-V materials could come into problems since this ashер gets up to 200°C. Speak with a process engineer before attempting to process III-V material.

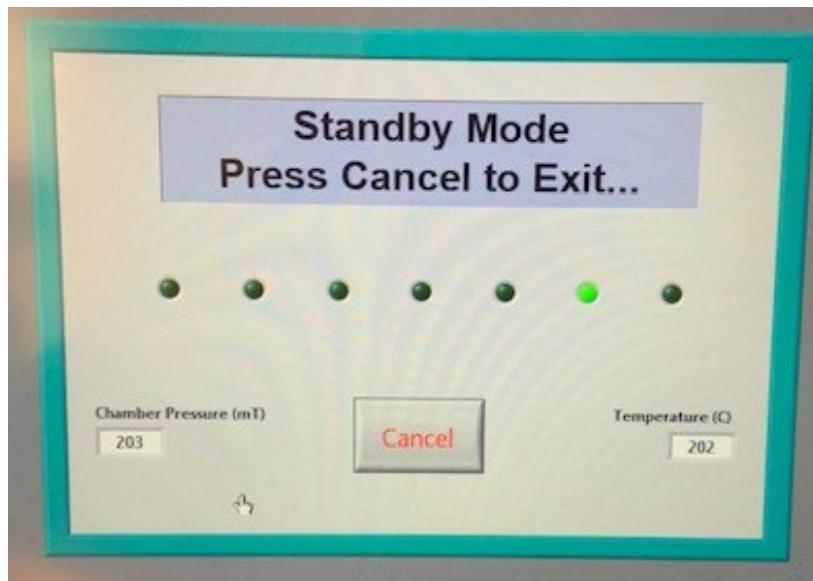
6 INSTRUCTIONS

6.1 Operating the system

- 6.1.1 Swipe in to the **CARD SWIPE**.
- 6.1.2 In Service Chase 2735 ensure the **Oxygen** and **Nitrogen** valves labeled **Trion Asher** are on.
- 6.1.21 Ensure the **ROUGHING PUMP/ROOTS BLOWER** is on – **GREEN** button.

6.1.22 Verify the chiller is **ON** in service chase and is at 25 degrees.

6.1.3 If the screen is dark or shows Standby Mode as below touch the screen or hit any key on the keyboard to wake up the computer. (Usually only for the first run of the day or off hours)



6.1.4 Press “**Cancel**” on the screen if in Standby Mode.

6.1.5 If not logged in use the following:

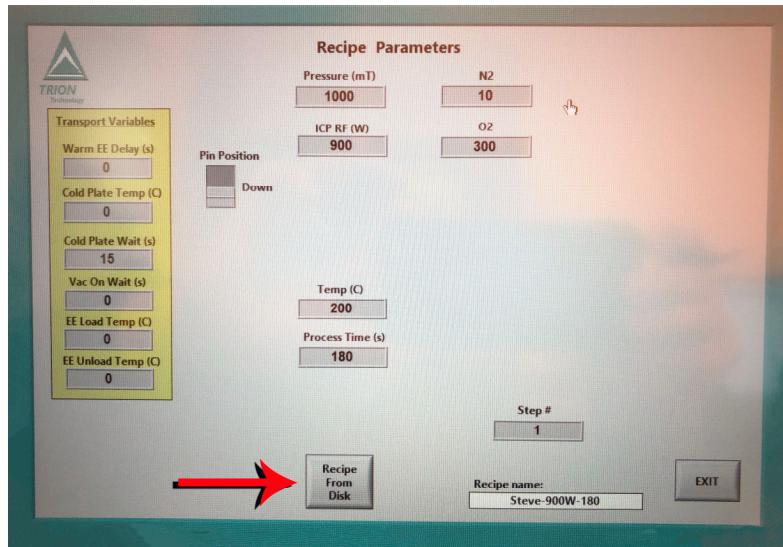
Login: **user**

Password: **user**

6.1.6 Load Wafer/Wafers into cassette labeled “**Trion Asher**”

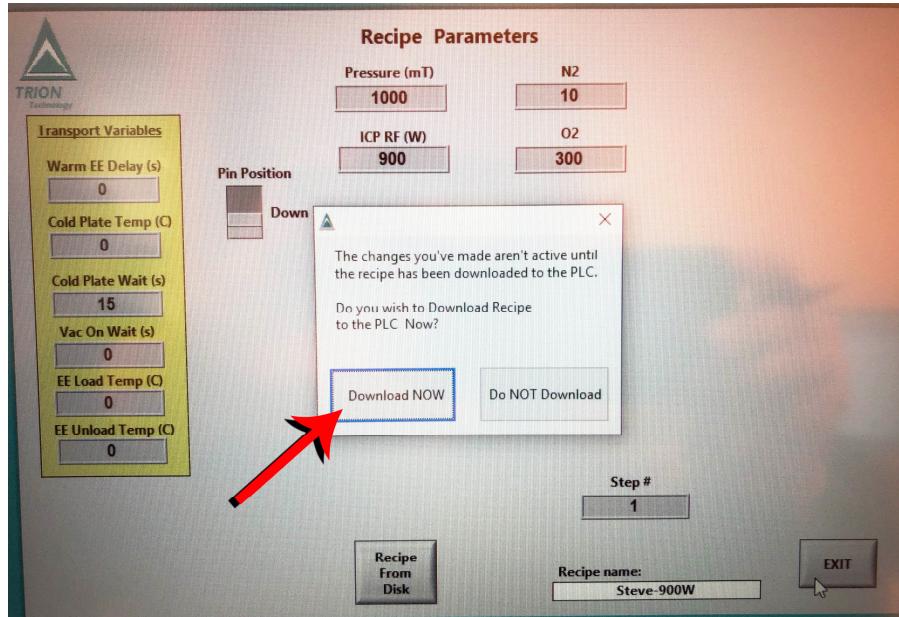
6.1.7 Press “**Load/Edit Recipe**”

6.1.8 Press “Recipe from Disk” Button



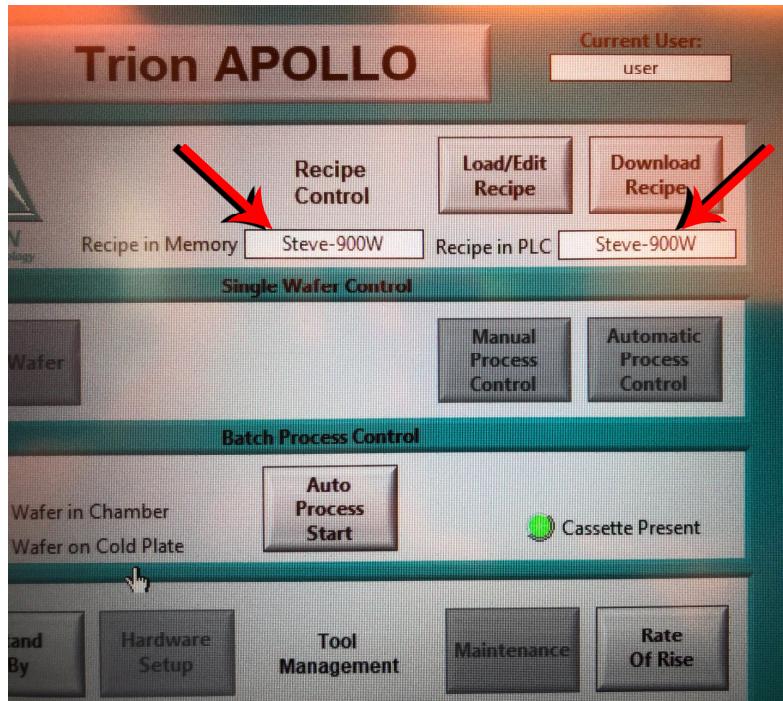
6.1.9 Press the button of the recipe you'd like to use. (Once the recipe is selected it will bring you back one screen)

6.1.10 Press “EXIT” (Prompt to download to PLC will appear)



6.1.11 Press “Download NOW”.

6.1.12 Verify the 2 WHITE boxes for “Recipe in Memory” and “Recipe in PLC” match.

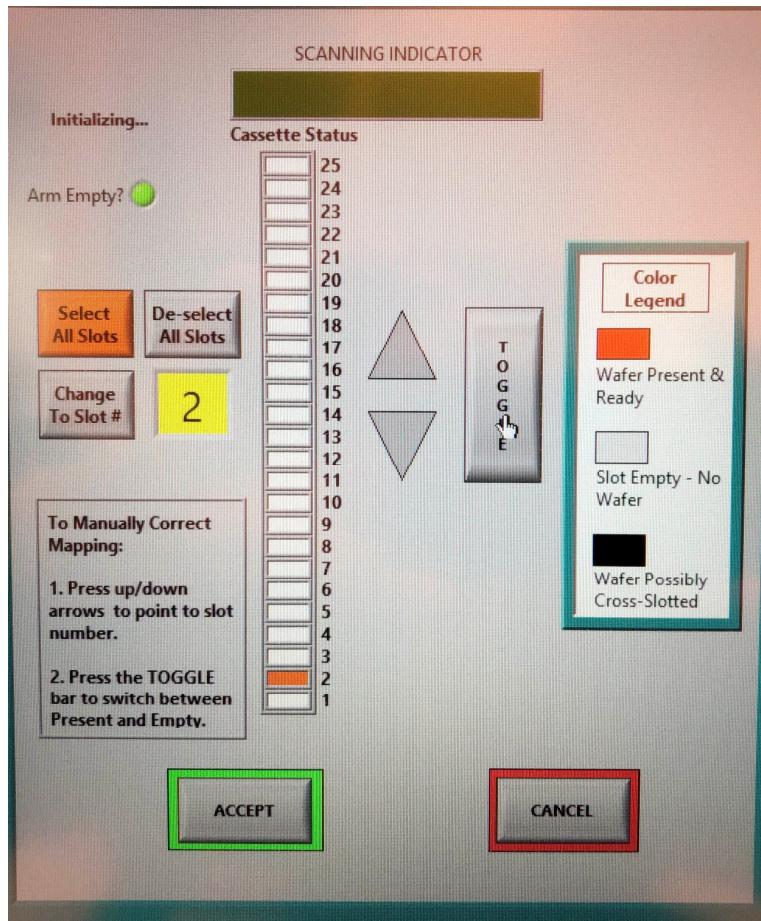


NOTE: If the machine was in “STANDBY” you must wait for the heater to reach 194-199°C before you start your run. This may take 15 minutes. You must be out of “STANDBY” mode to start the warm up.

6.1.13 Press “Auto Process Start” Button

6.1.14 When “Lot ID Code” pop up appears, Press “Enter” to skip or enter an identification like class number and date.

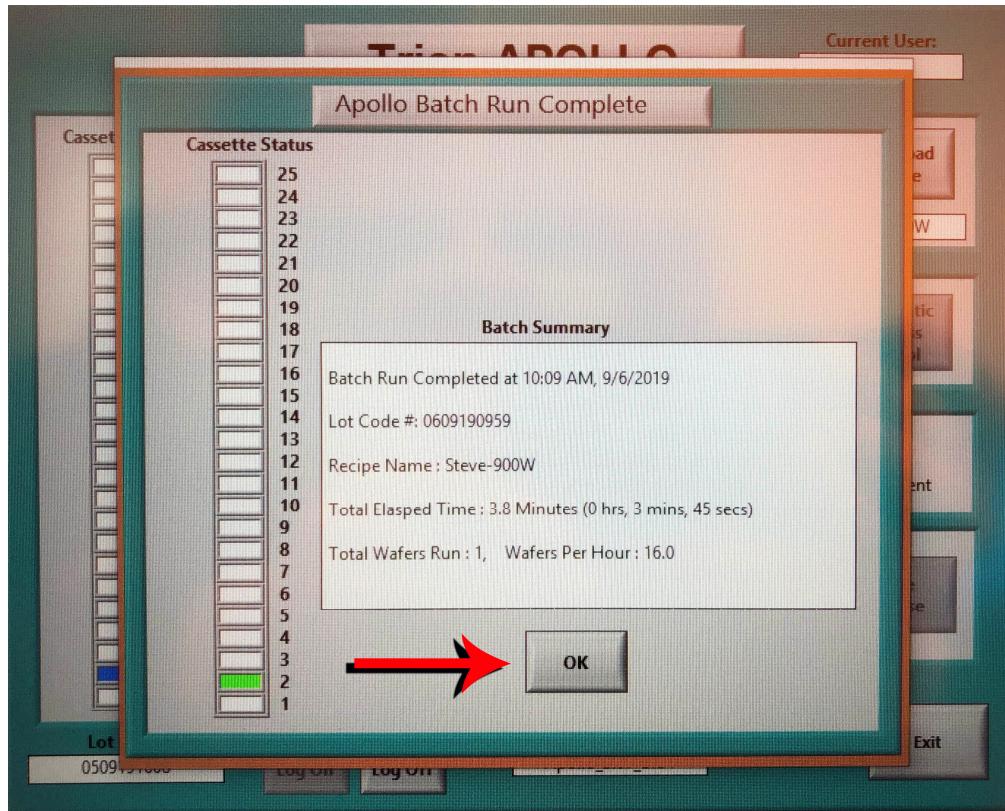
6.1.15 To select all slots in the cassette, press “Select All Slots” (ORANGE Button). To manually enter slots that have wafers do as follows:



- 1) Press the arrows on the screen (**Up or Down**) until the slot number you want is displayed within the **YELLOW** box.
- 2) Push the “**TOGGLE**” button.
- 3) Repeat steps 1 and 2 until all your slots that contain wafers are shown on the screen in **ORANGE**.

6.1.16 Press “Accept” (**GREEN** border all around it).

- 6.1.17 Robot will load the first wafer and begin to ash it. The screen will show the wafer as **YELLOW** (instead of **ORANGE**) meaning its ashing. Once ashing completes, the robot will move the wafer to the chill plate located below the cassette and change the screen status of the wafer from **YELLOW** to **BLUE** (chilling). Once chilling completes and the wafer is put back into the cassette it will change the status to **GREEN** (complete).
- 6.1.18 When your batch of wafers completes, and everything is done, the “**Apollo Batch Run Complete**” prompt will appear. Press “**OK**”.



- 6.1.19 Swipe out of the card swipe.

- 6.1.20 **During normal lab hours no further shutdown is needed.**

6.2 SHUTDOWN for OFF HOURS or END OF DAY:

- 6.21 Press “STANDBY” on display.
- 6.22 Turn **OFF** the **O2** and the **N2** Valves labeled “**TRION ASHER**” in **Service Chase 2735**.
- 6.23 Turn **OFF** Roughing Pump/Roots Blower package by pressing the **RED** OFF button.
- 6.24 Swipe out of **Card Swipe** system.

6.3 Errors during Run

- 6.3.1 If an error message comes up, contact a Technician.

7 APPROPRIATE USES OF THE TOOL

This tool is intended for processing wafers that contain **Aluminum**. No other metals should go into this ashser.

8 ATTACHMENTS

- 8.1 Recipe List

REVISION RECORD

Summary of Changes	Originator	Rev/Date
Original Issue	Zak Kogut	A - 09/03/2019
Removed “Apollo” references; edited text;	S. Blondell	B – 02/06/2020
Updated pump and chiller startup/shutdown procedures.	S. Blondell	C – 06/30/2020
Removed updated chiller startup/shutdown procedure.	R. Battaglia	D – 08/14/2020
Corrected shutdown and start up procedures	B Tolleson	E - 09/24/2020
Updated layout and shutdown	S Blondell	F – 09/25/2020